

Mon Nov 27 15:53:06 MST 2006

/m175.fa06/handouts175/PhantasyPhysicsB27/FantPhysB27

In the problems which follow, assume that the xy -plane is made of rigid, massless, transparent *stuff*.

- 1 For positive integers n , let P_n denote a y -axis point:

$$P_n = (0, 2^n),$$

where the coordinates are assumed to be measured in meters.

Furthermore, for each n , assume that a mass of 3^{-n} kg is concentrated at P_n .

- (a) Compute the total mass of this array.
 (b) Find the balance point of this array. That is, compute its center of mass.
- 2 Repeat problem 1 for the situation where we move all the points P_n to new positions: for positive-integer n ,

$$P_n = (0, 3^n).$$

- 3 Repeat problem 1 for the situation where we move all the points P_n yet again to new positions: for positive-integer n ,

$$P_n = (0, \sqrt{n} + 3).$$

Assume also that, for positive-integer n , a mass of $\frac{1}{n^2 - n + 1}$ kg is concentrated at point P_n .

- (a) Does this array have a finite mass?
 (b) Does this array have a balance point?
- 4 This problem is for folks who've worked on 11.9: 38. Here's a partial answer key for that problem:

- 38 (b) (ii): 2
- 38 (c) (ii): 4
- 38 (c) (iii): 6

Answer the problem 1 questions for the case that for all positive-integer n we have a mass of $n3^{-n}$ kg concentrated at $P_n = (0, 2^n)$.